

requested. The following is a comparison of the present invention with the Pine et al., Hayes and Master et al. references.

The present invention relates to an apparatus for depositing flux on a semiconductor chip and includes a jet printing head for printing a flux pattern on the flip-chip bumps on a semiconductor chip. The flux pattern is substantially identical to an arrangement pattern of the plurality of flip-chip bumps on the semiconductor chip. Hence, the flux is deposited by the jet printing head substantially only on the flip-chip bumps.

As claimed, the present invention deposits flux only on the flip-chip bumps, and not across the entire surface of the chip. This has a number of advantages, such as reducing the wasted flux randomly sprayed or brushed all over the entire surface of a chip, thereby reducing manufacturing costs. It also reduces the flux residue remaining on the surfaces of both the chip and the substrate, thereby reducing the risk of the device's functional failure during long-term use due to stress corrosion caused by exposure to temperature and humidity.

The references of Pine et al. and Master et al. were discussed at length in the response filed November 13, 2001. Pine et al., as conceded by the Examiner, does not employ a jet printing head for printing a pattern, but rather uses a plurality of fixed holes 24 through which flux is forced onto the work surface to form a uniform film of flux on the solder work surface. Hence, Pine et al. specifically seeks to provide a uniform film of flux, rather than a more controlled and specifically directed application of flux.

Master et al. describes a brushing technique, but does also not provide for the use of a jet printing head used to deliver flux.

The Examiner relies on Hayes, U.S. Patent No. 6,114,187, which shows jet printing heads. However, the Examiner's characterization of Hayes is factually flawed. The Examiner stated that Hayes discloses a method for preparing a chip scale package using solder jetting technology with a jet printing head for printing a flux pattern, on the flip-chip bumps 9. Applicant respectfully submits that Hayes does not describe the use of the jet printing head for depositing flux onto flip-chip bumps. Rather, Hayes describes the use of the jet printing head to deposit solder (or dielectric material). There is no description or suggestion whatsoever in Hayes to employ the jet printing heads 12-14 to deposit flux. It is only Applicant's own disclosure that provides such a suggestion to use jet printing technology to deposit flux. Applicant respectfully requests the Examiner to particularly point out where in Hayes it is disclosed that the jet printing head deposits a flux pattern onto the flip-chip bumps 9.

There is no motivation to combine the jet printing head and solder depositing technology of Hayes with the uniform flux deposition sought by Pine et al. and the brushing of flux by Master et al. It is inappropriate to combine references where the clear teaching of those references do not admit of such a combination. For example, even if Hayes were to suggest use of a jet printing head to deposit flux in some manner, it would be inappropriate to combine Hayes with Pine et al. to describe a flux deposition method that would selectively deposit flux over only selected flip-chip bumps when such a motivation is counter to the specific objectives (uniform deposition) sought by the structure of Pine et al. It has been repeatedly held that one having ordinary skill in the art can not be presumed realistically motivated to modify a reference in a manner

inconsistent with the disclosed objectives. *In re Fritch*, 972 F.2d 1260 23 USPQ 2d 1780 (Fed. Cir. 1992); *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984).

Further, even if the teachings of Pine et al., Hayes and Masters et al. were to be combined, the combination would not render obvious the present invention. Hayes describes the use of solder jetting technology to prepare the packages by creating the solder bumps, but nothing regarding flux depositing. One of ordinary skill in the art may employ Hayes to prepare the solder bumps, but would then use either the brush method of Master et al. or the uniform spraying of flux by Pine et al. to apply the flux to the solder balls created by Hayes. Nothing in any of the three references would suggest to one of ordinary skill in the art to apply the jet printing head, used by Hayes to create solder balls, to the application of solder flux. There is nothing in any of the references that suggests the suitability of jet printing head technology for depositing of flux, rather than dielectric material or solder. Again, it is only Applicant's disclosure that provides this teaching.

For all of the above reasons, the rejections of claims 6-12 under 35 U.S.C. § 103(a) should be reconsidered and withdrawn.

In light of the remarks above, this application should be considered in condition for allowance and the case passed to issue. If there are any questions regarding this amendment or the application in general, a telephone call to the undersigned would be appreciated to expedite the prosecution of the application.

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To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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